CHAPTER 3

# INPUT AND OUTPUT DEVICES

## INTRODUCTION

Input and output devices are required to communicate with the computer. These devices are connected to the CPU through various ports or with the help of wireless technologies. Input devices feed data and instructions into the computer, and output devices present information from a computer system. Output generated by the output devices may be hardcopy or softcopy output. Hardcopy outputs are permanent outputs which can be used later when required. They produce a permanent record on paper. Printer is a common output device, that produces hardcopy outputs. Softcopy outputs are electronic and are available on the screen in a digital form. They do not produce a permanent record. Monitor is a common softcopy output device.

## INPUT DEVICES

An input device is used to feed data into a computer. It is also defined as a device that provides communication between the user and the computer.

### Text Input Devices

### Keyboard

This is the most common input device. It is designed just like a conventional typewriter. It allows the user to input alphabets, numbers, and other characters. It provides keys for additional functions. It detects the key being pressed and generates the corresponding ASCII code which can be recognised by the computer. The standard US keyboard introduced in 1986 has 101 keys. It has a keyboard layout called the QWERTY design. QWERTY gets its name from the first six letters across in the upper left hand corner of the keyboard as shown in Figure 3.1. Normally, keyboards come in two sizes—one with integrated numeric keypad and other with a separate numeric keypad. Keyboards can be classified into wired and wireless. Wired keyboards are connected to the CPU through a serial, PS/2 port, or USB port. Wireless keyboards are connected to the computer through infrared (IR), radio frequency (RF), or bluetooth connections. Portable flexible keyboards are also available now. New generation keyboards like laser keyboards that project the keyboard layout to any surface are being developed.

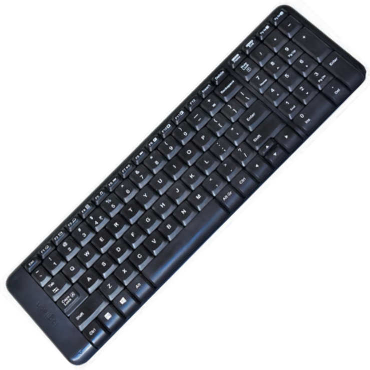
*Fig. 3.1: Keyboard*

### *Numeric keypad*

It is a small keyboard having only numbers. It is used to enter only numeric data such as those in ATMs. The computer keyboards also have a numeric keypad.

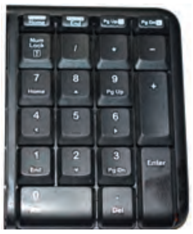
*Fig. 3.2: Numeric keypad*

### *PIN pad*

This is a device with a numeric keypad used to enter a personal identification number (PIN) of debit card or credit card while doing the transaction.

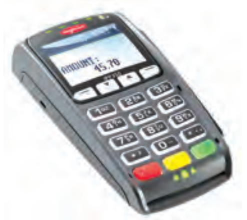
*Fig. 3.3: PIN pad*

## Pointing Devices

These devices are used to move an onscreen pointer or cursor (usually an arrow). They are commonly used with graphical user interfaces (GUIs).

### Mouse

It is a small handheld device used to indicate the position of a cursor or its movement on a computer's screen by rolling it over a mouse pad or flat surface. A mouse has one or more buttons and possibly a scroll wheel. This scroll wheel is used to scroll the screen vertically or horizontally. The different types of mouse are ball, optical, and laser mouse. Ball mouse works on the principle of the movement of the ball, whereas optical mouse uses LED and laser mouse uses laser beams for sensing the movement. Laser mouse has more precise movement when compared to other types of mouse. Wired mouse uses serial, PS/2, and USB ports, to communicate, whereas a wireless mouse comunicates with the computer via radio waves.

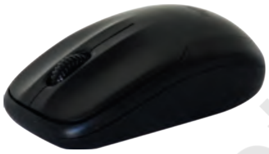
*Fig. 3.4: Mouse*

## Light pen

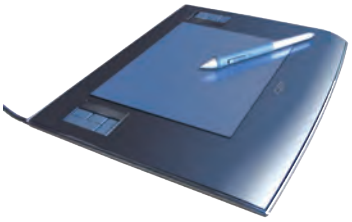

Fig. 3.5: Light pen

It is a pointing device shaped like a pen. The tip of the light pen contains a light-sensitive element which when placed against the screen detects the light from the screen, enabling the computer to identify the location of the pen on the screen. Light pens have the advantage of drawing directly on the screen. They are used by engineers, artists, fashion designers for Computer Aided Designing (CAD) and other drawing purposes.

## Touch screen

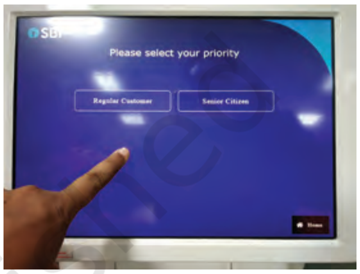

Fig. 3.6: Touch screen

It is an input device that allows the user to operate by simply touching on the display screen. Some computers, tablets, smartphones, etc., have touch-sensitive display screens. It can also be operated using a stylus which gives more precision. Information kiosks at railway stations and bank ATMs also use touch screens as input device. Nowadays, touch screens is the most common hardware interface for electronic gadgets.

## Graphic tablet

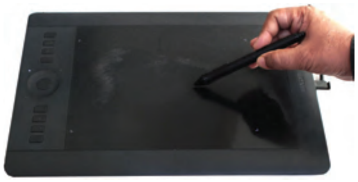

Fig. 3.7: Graphic tablet

This consists of an electronic writing area and a special pen that works with it. It allows artists to enter natural hand movements to create graphical images with motions and actions similar to traditional drawing tools. A stylus is used like a pen and moved over the surface of the tablet. Stylus' movement data is then sent to the computer. The pen of the graphics tablet is pressure sensitive. Hard or soft pressure on the tablet using the pen can result in brush strokes of different widths in an appropriate graphics program.

## Touchpad

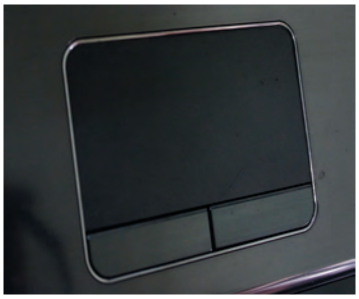

Fig. 3.8: Touchpad

This is a pointing device found on the laptop computers in place of a mouse to control the pointer. It allows the user to move the finger across the touchpad just as a mouse pointer does and this movement in the form of data is sent to the computer. Touchpad is operated with fingers and dragging it across the flat surface, as the finger moves on the surface, the mouse cursor will move in that same direction. The touchpad also has two buttons below the touch surface that enables clicking.

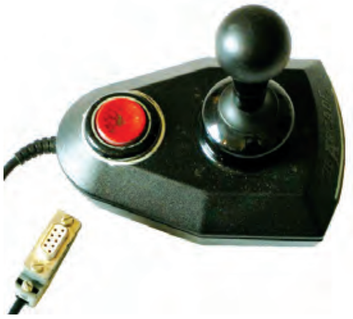

Fig. 3.9: Joystick

### Joystick

This is an input device used for playing video games, controlling training simulators and robots. Joysticks and other game controllers can also be used as pointing devices. The joystick has a vertical stick which can move in any direction. It can be used to control objects in a video game or to make menu selections by the movement of a cursor displayed on the screen. It has a button on the top that is used to select the option pointed by the cursor.

## Audio Visual Input Devices

### Scanner

Scanning is a process of taking a close-up photograph. Scanner is an input device which functions like a photocopying machine. It has a glass plate to place the paper which is to be scanned. Scanners can capture information, like pictures or text, and convert it into a digital format that can be edited using a computer. The scanned image or document is captured by the laser beams and converted to digital data. The scanned picture or document can be saved in the computer. The quality of the image depends on the resolution of the scanner. The resolution of the image scanned is expressed in dots per inch (DPI). The higher the DPI, the better will be the resolution of the scanned image.

The different variants of scanners are flat bed, sheet feed, and hand held scanner. A sheet feed scanner can scan a single sheet, whereas a flat bed can scan even from a book but they are not portable. A hand held scanner is portable but the scanning action is not smooth as the scanner is moved manually.

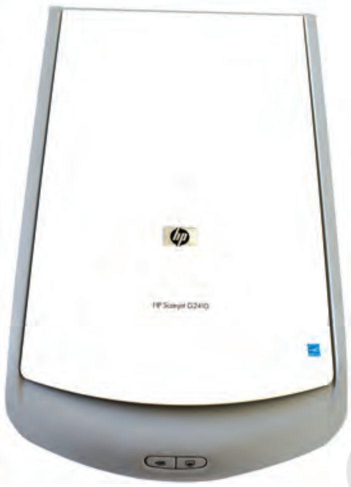

Fig. 3.10: Flatbed scanner

### Microphone

This is used to input human voice into the computer. It is attached to a computer for the input of sound. It accepts sound which is analogue in nature as input and converts it to digital format. The digitised sound can be stored in the computer for processing or playback. The headphones come with microphones to use chat applications. A computer loaded with speech recognition

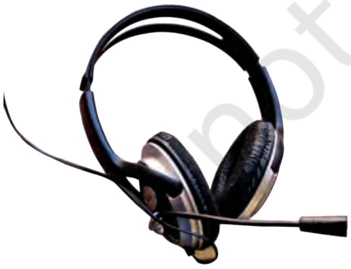

Fig. 3.11: Microphone

software like the one pre installed in Windows 7 can convert what a person has said into text, which can be saved for word processing. A voice recognition program can process the input and convert it into machine recognisable commands.

## Digital camera

Fig. 3.12: Digital Camera

This can take pictures and videos and convert them into digital format. Pictures or videos taken using a digital camera are stored inside its memory and can be transferred to a computer by connecting the camera to it. It is a kind of small computer that controls camera focus, stores images, etc. It runs a very simple operating system (stored on ROM) and usually provides a menu-based GUI for the user.

The quality of the lens, the density of charge coupled device (CCD), resolution (measured in megapixel), optical zoom, and the software used in the camera determines the quality of the picture. Each picture is made up of thousands of tiny pixels (picture elements) and the camera stores the data on the colour of each dot. The quality of the picture is determined by the number of pixels in each picture. Digital cameras have resolutions ranging from 2 mega pixel to 24 megapixels and optical zoom ranging from 3x to 60x.

## Webcam

Fig. 3.13: Webcam

It is a compact and less expensive version of a digital camera. It is used in computers for video chatting. It does not have an internal memory. It is a very basic video camera used to feed live video into a computer. The video data from a web cam is low quality compared to a full video camera. It is positioned on top of the laptop monitor and for desktop computers it can be connected externally. Applications like Skype, Yahoo Messenger, etc., use webcam to capture images. Now, laptops also come with an inbuilt web camera.

## Closed circuit TV (CCTV)

Fig. 3.14: CCTV

CCTV captures the images and videos fed as input to the computers. (Figure 3.14). CCTVs are commonly used to maintain road safety and the security on premises.

## Input card Readers

### Smart card or chip reader

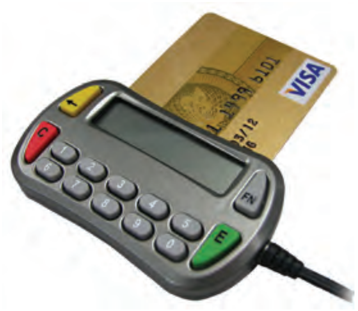

*Fig. 3.15: Smart card reader*

This is a plastic card that stores and transacts data. It has a tiny 'chip' of computer memory embedded inside. Data can be stored in the chip's memory and read back using a 'chip' reader. The data card may contain a memory or a microprocessor. Memory cards simply store data, while a microprocessor card on the other hand can add, delete, and manipulate information in its memory. The smart card is used in most banking, healthcare, telephone calling, electronic cash payments, and other applications.

Smart card readers are used to access data in a smart card. It can be contact type or contact less. A contact type of reader requires physical contact with the cards, which is made by inserting the card into the reader. A card is inserted into the reader where metal contacts connect to the metal pads on the front face of the card. The reader can access the data stored on memory chip. A contact less type of reader works with a radio frequency that communicates when the card comes close to the reader. Many contact less readers are designed specifically for toll gate payment in transportation applications and person identity applications. Satellite TV decoders use smart cards to store data regarding subscription of channels by the user. The data is encrypted so that it is not easy to alter. Many types of cards—ID cards, phone cards, credit cards, and door security cards use this system.

### Magnetic strip reader

The credit cards have a magnetic strip. This strip stores the user's data in the form of magnetised dots (for example, the credit card number, card expiry date, and customer name). The strip allows inputting of this data to a computer system faster and more accurately than typing. A magnetic strip reader is used to read the data by swiping the card through a slot on the reader.

## Input-reading Text or Codes

Entering the data in a computer using a keyboard may be a slow process and it is prone to mistakes. Sometimes speed and accuracy may be essentially required. In such cases, the following input devices are used to read and input the data.

### Barcode or Quick Response (QR) code reader

It is a set of vertical lines of different thickness and spacing that represent a number. These lines are read by a barcode reader or scanner. Barcode readers are devices that are used to input data from such set of barcodes (Figure 3.16 (b)). This code is converted to an alphanumeric value and is fed to the computer connected to it. The bar code reader reads and enters the value quickly and accurately than entering the data by using a keypad. Barcode is used to code items in a shop and books in a library. Handheld scanners are commonly seen in shops to scan codes and price information for each of the items to make billing easier. Mobile phones with camera and special software can also be used as a barcode reader.

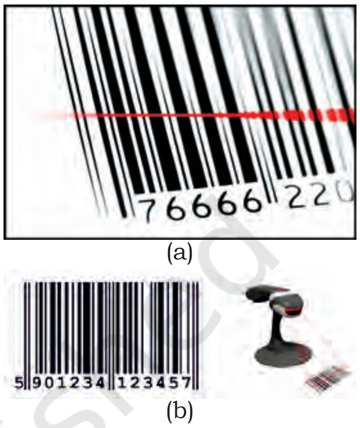

*Fig. 3.16: (a) Bar code, (b) its reading using BCR*

QR codes are similar to barcodes. Barcodes are single dimensional, whereas QR codes are two dimensional as shown in Figure 3.17. The two dimensional way of storing data allows QR code to store more data than a standard barcode. This code can store website URLs, plain text, phone numbers, email addresses, and any other alphanumeric data. The QR code can be read using a barcode reader or a mobile phone which has a camera and special software installed.

*Fig. 3.17: QR code*

### Optical Mark Reader (OMR)

It is an input device that recognises marks made by a pencil or pen in a multiple-choice type form. It is commonly used to check forms filled with pen or pencil and to correct MCQs of exam papers. It can read the marks and feed that data to a computer (Figure 3.18).

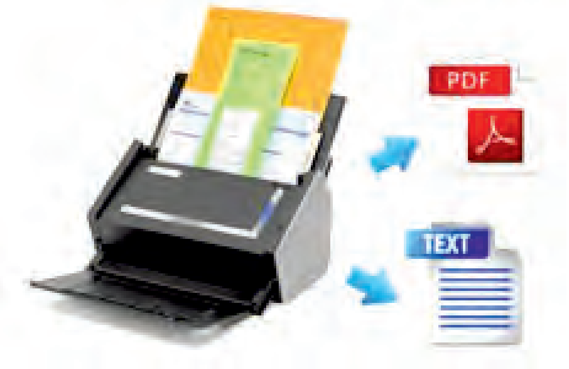

*Fig. 3.18: Optical mark recognition*

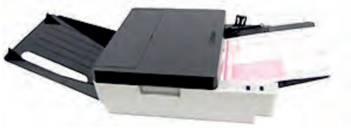

*Fig. 3.19: Optical mark recognition*

OMR technology scans a printed form and reads predefined positions and records the marks on the form. This technology is useful for applications in which large number of forms needs to be processed quickly with great accuracy, such as objective type tests and questionnaires.

OMR sheets are normally used to evaluate multiple choice questions in competitive exams. It consists of bubble shaped options to mark the answers. Candidates are required to darken the correct bubble option using a pen or pencil (refer to Figure 3.19). For accuracy of results, good quality paper and accurate alignment of printing is essential.

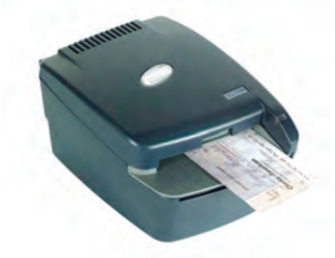

*Fig. 3.20: MICR*

### Magnetic Ink Character Reader (MICR)

It reads the data written by the magnetic ink. The cheque number is printed at the bottom of each bank cheque by special magnetic ink using a special font. It can be detected by a MICR reader. MICR reads this data and feeds it to the computer quickly and accurately (Figure 3.20).

### Optical Character Recognition (OCR)

This is a software technology that converts images of text into an actual text file. To use this technology, first scan the document using the scanner. Then the scanned image is analysed by the OCR software. The result is such that it seems the text has been typed by hand.

## Input Sensors

A sensor is a device that senses the real world data (for instance, temperature) and converts it into digital data to be processed by the computer. A computer system cannot sense the real world data such as light or dark, hot or cold, quiet or noisy. We use our senses (eyes, ears, mouth, nose, and skin) to read such data. In the same way, the sensor reads this kind of data and converts it into its digital equivalent. The sensors are connected to a computer.

### Remote control

This is a very commonly used input device. It sends data signals each time a button is pressed using infrared light or radio signals. The signals can control the system from some distance. It is also used to control a presentation slide show.

## Biometric sensor

It is a device that identifies unique human physical features with high accuracy. It is an essential component of a biometric system which uses physical features like fingerprints, retina, iris patterns, etc., to identify, verify, and authenticate the identity of the user. The three major types of biometric sensors are semiconductor sensor, optical sensor, and ultrasound sensor. Figure 3.21 shows a biometric sensor.

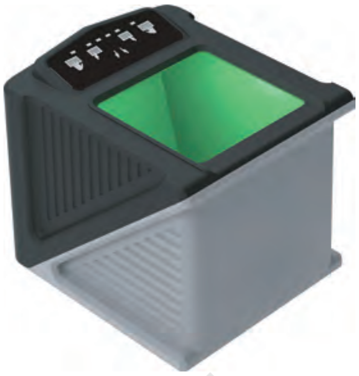

*Fig. 3.21: Biometric sensor*

## Practical Exercise

**Identify the following input devices and list their features.**

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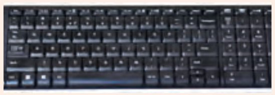
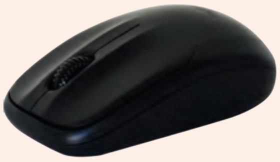
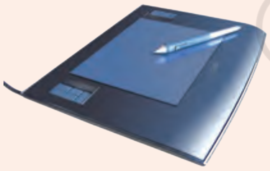
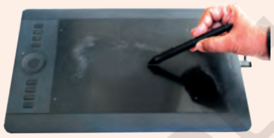
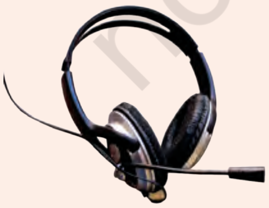
|  | |
|  | |
|  | |
|  | |
|  | |

## Output Devices

These can be categorised into three types based on the output produced by the computer in the following form:

1. soft copy
2. hard copy
3. sound output

### Soft copy output device

The output on the screen is called a soft copy. The soft copy output can be provided on the following devices.

#### *Visual Display Unit (VDU)*

This is an output device that visually conveys text, graphics, and video information. Information shown on a display device is called softcopy because the information exists electronically and is displayed for a temporary period of time.

Display devices include Cathode Ray Tube (CRT) monitors, Liquid Crystal Display (LCD) monitors, Thin Film Transistor (TFT) monitors, Light Emitting Diode (LED) monitors, and gas plasma monitors.

Some of the characteristics of a VDU are size, resolution, pixel pitch, and response time. VDUs are available in different sizes. The size of a monitor is measured diagonally across the screen in inches. The resolution of the monitor is the maximum number of pixels it can display horizontally and vertically (such as 800 x 600 or 1024 x 768 or 1600 x 1200). The pixel spacing on the screen is called the dot pitch. A screen with smaller dot pitch produces sharper images. Response time refers to the time taken for a pixel to turn from a state of brightness to a state of darkness and then back again. Monitors with lesser response time provide better movie viewing experience.

The CRT monitors were used earlier. Nowadays they are not being used, as flat LCD monitors are available at the same cost. But it is essential to know the old technology also. The CRT monitor looks like a television set from the past. It is large in size, heavy, and consumes more electricity because it contains a large cathode ray tube. It is available in two forms—monochrome and color. A monochrome monitor displays characters and images in a single color on a dark background. Another variation of monochrome monitor is capable of displaying different shades of gray and is called a gray scale monitor. A color monitor uses three different basic colours such as red, blue, and green to display 16 to 1 million different colours. These monitors are preferred by graphic artists for their accurate colour rendering and by gamers for faster response to rapidly changing graphics.

*Flat panel monitor*

These are very thin, lightweight, and need very less power. Flat panel displays are thinner, lighter in weight, consume less power, and emit less heat as compared to CRT monitors. They are most commonly used in computers, especially in laptops. Different types of flat panel monitors are LCD (Liquid Crystal Display), LED (Light Emitting Diode) and OLED (Organic LED). LCD uses liquid crystal molecules for display, LED uses light emitting diodes for display, and OLED uses a special organic compound for display. LED displays have better brightness.

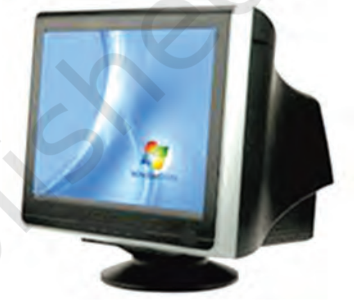


*Fig. 3.22: CRT monitor*

Liquid crystal display (LCD): This displays consists of liquid crystals sandwiched between two plastic plates. These crystals rearrange to form an image when an electric current passes through them. A light source at the back of this plate makes the picture visible. This light source can be a fluorescent lamp or LED.

Light emitting diode (LED) monitor: This uses LED directly behind the liquid crystal display (LCD) in order to light up the screen. This technique is very effective and gives each area of the screen its own light, which can be on or off. LED screens can produce massive contrast ratios resulting in better color quality and clarity. Further, wider viewing angle, faster refresh rates, and power saving are its other advantages, making this technology expensive.

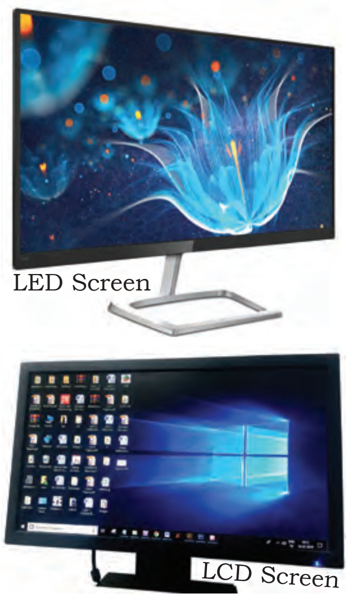


*Fig. 3.23: LCD and LED display*

Fig. 3.24: Plasma monitors

Plasma monitors: A flat panel display consists of sandwiching neon or xenon gas between two sealed glass plates with parallel electrodes deposited on their surfaces. When a voltage pulse is passed between two electrodes, the gas lights up as different colours creating images on a monitor. Plasma monitors provide high resolution but are also expensive.

Organic light emitting diode (OLED) monitors: The panel of OLED is made up of millions of tiny LEDs. The 'O' in OLED stands for organic which means there is carbon in the light emitting layer of the panel. OLED screens are thinner and lighter than LCDs and LEDs. They can produce better quality images and have a better viewing angle. OLEDs consume less power but are again very expensive.

*LCD projector*

Fig. 3.25: Multimedia projector

This is a type of video projector used for displaying videos, images, or computer data on a large screen or any other flat surface. Several people in a classroom can view the output on a wide screen at the same time. It is a modern equivalent of the slide projector or overhead projector. A beam of high-intensity light travels through thousands of shifting pixels in a LCD display. This beam of light then passes through a lens which projects and focuses the image on the surface.

## Hard copy output devices

Hard copies are tangible computer outputs. Printer and plotter are used to get a hard copy output.

### *Printer*

This is used to produce a hard copy output. There are different kinds of printing technology. Two factors that determine the quality of a printer are its resolution and speed. Resolution is measured in terms of DPI. Speed is measured in terms of number of characters printed in a unit of time and is represented as characters per second (CPS), lines per minute (LPM), or pages per minute (PPM). Based on the technology used, they can be classified as impact or non-impact printers.

*Impact printers*

These use the typewriting or printing mechanism where a head or needle strikes against an ink ribbon to make a mark on the paper. The ink ribbon used in this printer is not very expensive. It is used in banks and shops for printing receipts, etc. Dot matrix printers fall under this category.

Dot matrix printers: Use small electromagnetically activated pins in the print head and an inked ribbon to produce images by impact. The most commonly used printer heads consists of nine pins. Certain printers use 24 pins for better print quality. A dot matrix printer prints a letter in a grid or matrix pattern of dots. It forms the letters by hitting the print on the ribbon and then both the papers. Its print quality is poor and also produces noise while printing. But its running cost is very less and one can also print multiple copies in one go using the carbon paper between the papers. These printers are slow and noisy and are not commonly used for personal use. The dot matrix printers are widely used at cash counters in shops due to their low printing cost and because we can get carbon copies from them.

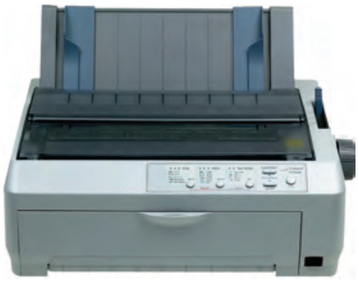


*Fig. 3.26: Dot matrix printer*

Line Printer: The line printer also uses the similar technology but it is a fast printer which prints one row at a time. This means it can print upto 3,000 lines per minute (Figure 3.27).

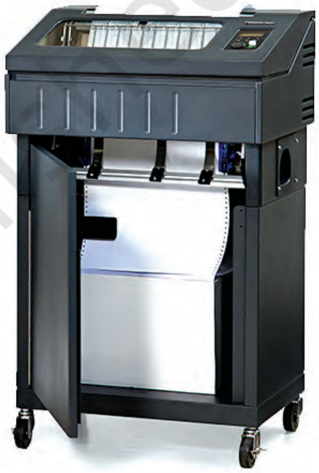


*Fig.  3.27: Line printer*

*Non-impact printers*

These do not touch the paper while printing. And since they don't strike the printer head, they are not noisy. They use different technologies to print characters on paper. Inkjet, laser, and thermal printers fall under this category. Running cost of these printers is more expensive than impact printers.

Inkjet printers: These form the image on the page by spraying tiny droplets of ink from the print head. The four colour ink (cyan, yellow, magenta, and black) is used to produce colour printouts. The droplets of ink come from tiny holes (the jets). Each droplet creates

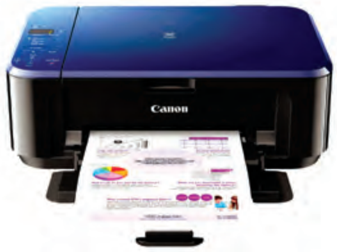


*Fig. 3.28: Inkjet printer*

Fig. 3.29: Laser printer

Fig. 3.30: Laser printer's toner

Fig. 3.31: Thermal printers

a tiny dot on the paper. Since the dots are so small, the quality of the printout is excellent (1200 dots per inch are possible). They are used to print photographs. They are inexpensive, but the cost of ink cartridges makes it a costly affair in the long run.

Laser printers: These produce a good quality output. It utilises a laser beam to produce an image (through a mirror) on a drum. The light of the laser alters the electrical charge on the drum and applies toner (dried ink) in the cartridge. The toner powder from the toner cartridge is then sprayed onto the drum. The toner powder sticks onto the portions traced on the drum by the laser beam. It is transferred to a paper by rolling the paper over the drum. Through heating, the powder is fused onto the paper. There are laser printers which print about four A4 size papers per minute. These printers produce clear and quality printouts. They are also faster and their speed is rated in pages per minute (PPM). Monochrome and colour laser printers are available. Colour laser printers use multiple colour toner cartridges to produce colour output and are expensive.

Thermal printers: These produce a printed image by selectively heating heat sensitive thermal paper when it passes over the thermal print head. The coating turns black in the areas where it is heated, producing an image. These printers are less noisy and faster than dot matrix printers. They are also smaller, lighter, and consume less power, making them ideal as portable printers. They are commonly used in business to print receipts in devices such as an ATM and in printing labels.

The features of all the above printers are summarised in the Table 3.1.

**Table 3.1**

**Comparison of printers**

| Features | Laser Printers | Inkjet Printers | Thermal Printers | Dot Matrix Printers |
|---|---|---|---|---|
| Printing material used | Ink powder | Liquid ink | Heat sensitive paper | Ink soaked ribbon |
| How does it print? | It fuses the powder on the paper through heating. | It sprays liquid ink on paper through microscopic nozzles. | Thermal paper is passed over the thermal print head. | Pins are pushed against ribbon on paper. |
| Printing speed | 20 pages per minute | 6 pages per minute | 150 mm per second | 30550 characters per second |
| Quality | Printing quality is good. Best for black and white. | Printing quality is good, especially for smaller fonts. | Poor quality printing of images. Good quality text printing. | Poor printing quality for images. In terms of text, printing is good. |
| Advantages | Less noisy, prints faster, high print quality. | Less noisy, high print quality, no warm up time, device cost is less. | Less noisy, fast, smaller, lighter, consumes less power, portable | Cheaper to print as ribbon is cheap, carbon copy possible. |
| Disadvantages | More susceptible to paper jams. Toner is expensive. Device itself is expensive. | Ink is expensive and not waterproof, and nozzle is prone to clogging. | Requires special thermal quality paper, poor quality printing. | Initial purchase and maintenance are both expensive, printing is not fast, makes noise. |

*Three dimensional (3D) printers*

This is a new generation output device used to print 3D objects. It can produce different kinds of objects in different materials and this can be done using the same printer. It can print anything from ceramic cups to plastic toys, metal machine parts, stoneware vases, fancy chocolate cakes, etc.

The 3D printing process turns the object to be printed into thousands of horizontal tiny little layers. It then prints these layers from bottom to top, layer by layer. These tiny layers stick together to form a solid object.

### *Plotter*

It is an output device used to produce hard copies of graphs and designs on the paper. Plotters are used to print the drawings by using a special pen. Coloured pens are used to produce colour line drawings. The pens are held by an arm which can lift the pen up or down, and move across the paper. The arm and pen of the plotter creates drawing just like humans but with more speed and accuracy. A plotter is typically used to print large format graphs or maps such as construction maps, engineering drawings, and big posters. It is used in the designing of cars, ships, aircrafts, buildings, highways, etc. Plotters are used by designers and architects since they work with huge pieces of paper, that a normal printer cannot handle. They are not used to print the text and images. They are used to print the drawings prepared by the CAD software. Plotters are of two types: drum plotters and flatbed plotters.

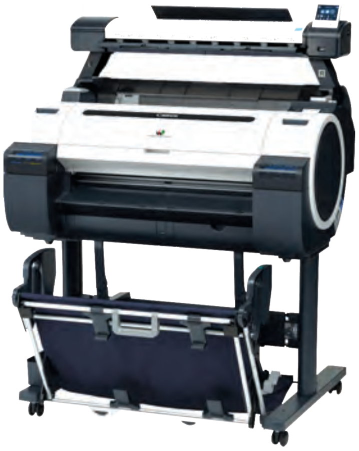


*Fig. 3.32: Drum plotter*

#### *Drum plotter*

It is also known as a roller plotter. It consists of a drum or roller on which a paper is placed and the drum rotates back and forth to produce the graph on the paper. It also consists of a drawing arm that holds a set of coloured ink pens or pencils. The drawing arm moves side to side as the paper is rolled back and forth through the roller. In this way, a perfect graph or map is created on the paper.

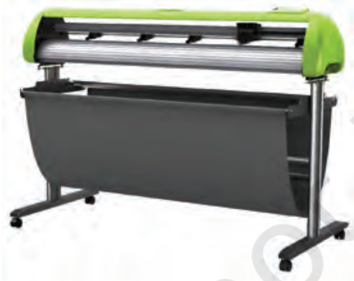


*Fig. 3.33: Flatbed plotter*

#### *Flatbed plotter*

It is also known as a table plotter. It plots on paper that is spread and fixed over a rectangular flatbed table. The flatbed plotter uses two drawing arms, each of which holds a set of coloured ink pens or pencils. The drawing arms move over the stationary paper and draws the graph on the paper. Flatbed plotter is very slow in drawing or printing graphs. The large and complicated drawing can take several hours to print.

## Sound output device

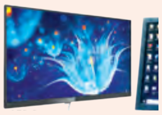
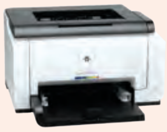
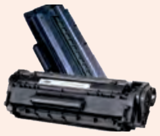
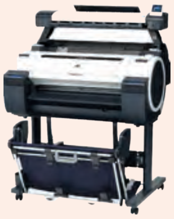
The device which gives a sound output is called a speaker. Speaker devices are designed for personal and public use.

The audio output is the ability of the computer to produce sound. Speakers are the output devices that produce sound. They are connected to the computer through audio ports. They produce sound by the movement of the diaphragm in the speaker, forward and backward according to the electrical signals coming out of the audio port. For high quality sound reproduction, computers use 2.1 (3 speakers), 5.1 (5 speakers), and 7.1 (7 speakers) speaker systems.

*Fig. 3.34: Speaker*

## Practical Exercise

**Identify the following output devices and list its features**

| | |
|---|---|
|  | |
|  | |
|  | |
|  | |

## Check Your Progress

**A. Multiple choice questions**

1. In ink jet printers, to produce an image it uses _________
   (a) special pen.
   (b) tiny droplets ink.
   (c) laser beam.
   (d) All of these
2. Printer in which printing head and paper is forced together to form letters is called _______________
   (a) impact printer.
   (b) non-impact printer.

**NOTES**

(c) page printer.
(d) line printer.

3. Which printer is an impact printer?
   (a) Laser printer
   (b) Line printer
   (c) Ink jet Printer
   (d) All of the above
4. Which of the following groups consist of only output devices?
   (a) Scanner, printer, monitor
   (b) Keyboard, printer, monitor
   (c) Mouse, printer, monitor
   (d) Plotter, printer, monitor
5. Printers are examples of ______________ output device.
   (a) hardcopy
   (b) softcopy
   (c) double copy
   (d) None of these
6. In LCD, 'L' stands for ___________________.
   (a) light
   (b) liquid
   (c) limit
   (d) long
7. Which of the following is a type of monitor?
   (a) LCD
   (b) CRT
   (c) LED
   (d) All of above
8. Computer output which is printed on paper and is tangible is known as _______________.
   (a) hardware
   (b) hard copy
   (c) document
   (d) result
9. The smallest unit of an output device display is called a _________________.
   (a) pixel
   (b) picture unit
   (c) VDT
   (d) monitor
10. Touchscreen is usually used to detect the touch of a _______________.
   (a) human finger
   (b) pen
   (c) wooden stick
   (d) None of these

### B. Fill in the blanks

1. CRT and LCD are types of _____________.
2. A digital camera can take pictures and videos and convert them into a _____________ format.
3. Web camera is a compact and less expensive version of a _____________ camera.
4. Smart card readers are used to access data in a ____________ card.
5. The credit cards have a _____________ strip.
6. A QR code is similar to _____________.
7. Magnetic ink character reader reads the data written by the _____________ ink.
8. The output on the screen is called a _____________ copy.
9. Printers are used to produce a _____________ output.
10. A laser printer produces _____________ quality output.
11. The device which gives a sound output is called a _____________.

### C. State whether the statement given below are True or False

1. Thermal printer is used to print the drawings by using a special pen.
2. Speaker is an audio input device.
3. Inkjet printer is an impact printer.
4. CD, LED, and CRT are the technology used in monitor.

### D. Short answer questions

1. What are non-impact printers?
2. What do you mean by output devices?
3. List all output devices.
4. Priyanka is taking up digital photography and she wants a printer that enables to print her photos, with the best results. Which printer would you recommend and why?
5. Printers are generally classified as 'impact' and 'non-impact'. Which category does a laser printer fall into?
6. In printing, DPI is the standard measure of printed image quality on the paper. What does DPI stand for?

## NOTES